F1-117

Request for Funding for Remediation of the Stowell Mine

Submitted by Mining Remedial Recovery Company

Executive Summary

This proposal requests funding for remedial actions at the Stowell Mine, which is located in the Spring Creek Drainage. Water flowing in Spring Creek is discharged from the Spring Creek Debris Dam into the Sacramento River eight miles downstream of Shasta Dam.

A primary biological and ecological objective of this project is to improve the spawning and rearing habitat for anadromous species in the Sacramento River and Bay-Delta ecosystems. This objective will be achieved by reducing the cadmium, copper, and zinc load from the Stowell Mine to Spring Creek and the Sacramento River. This proposal is consistent with the CALFED objectives to fund actions which address non-flow related factors and focus on contaminant source reduction. Improvements to water quality in the upper Sacramento River should also enhance the health of the estuarine habitat downstream. Specifically, this project is expected to help restore the instream aquatic habitat for key species such as chinook salmon and steelhead trout.

The proposed project components include a surface water diversion, waste rock consolidation, and a passive acid mine drainage (AMD) treatment system. The project tasks, anticipated completion dates, and associated costs are shown in Table 1.

Table 1. Stowell Mine Remediation Project Tasks

Task	Cost	Completion Date
1. Consolidate waste rock area	$50,000	10/1/97
2. Install a surface water diversion around waste rock area	100,000	11/1/97
3. Inject neutralizing and reducing material into mine voids	200,000	12/19/97
4. Install pipeline to collect portal and seepage water	200,000	5/1/98
5. Install a passive limestone treatment system	200,000	6/1/98
Total Cost	**$750,000**	

The Stowell Mine is located in part on property owned by Mining Remedial Recovery Company (MRRC). MRRC was formed specifically to remediate sites impacted by mining activities, and is actively reclaiming several mine, mill, and smelter sites located throughout the United States. Key personnel at MRRC have extensive knowledge of general mine remediation technologies, as well as the site specific conditions at the Stowell Mine. Michael W. Baum (President and CEO) has over 20 years of management experience related to mining and mine reclamation. Linda M. Mercurio (Environmental Engineer/Project Manager) has coordinated the design, implementation, and monitoring of remedial activities at several MRRC owned mines in the Shasta Lake area. Ken

Henderson (Construction Manager) has extensive experience managing mine remediation and construction projects.

MRRC has water quality data related to the Stowell Mine dating back to 1991. In August 1996 and March 1997, MRRC and Adrian Brown, Inc., collected samples from portals, waste rock dumps, seeps, springs, and the receiving stream. MRRC plans to continue collecting monthly portal samples, quarterly receiving stream samples and periodic seep and spring samples before, during, and after the implementation of remedial actions at the Stowell Mine.

It is not expected that implementation of this project will result in significant third party impacts. The Stowell Mine, lies in part on property owned by Shasta Copper Exploration, Inc. MRRC has sent a copy of the proposed remediation project design to Shasta Copper Exploration, Inc., and is awaiting comments. MRRC will also submit copies of this proposal to appropriate parties at the CRWQCB, the California Department of Fish and Game, the US Forest Service, the US Bureau of Land Management, and US Bureau of Reclamation. In addition, MRRC will post applicable signs along the access road to the work sites during construction.

To date, MRRC has coordinated and funded water quality studies, the production of detailed base maps, and the completion of a comprehensive feasibility study for several MRRC owned mines located in the Shasta Lake area. In addition, MRRC has expended more than $2,000,000 to implement control actions at the Mammoth, Balaklala, Stowell, and Keystone Mine sites. MRRC is open to negotiating a cost sharing plan with the CALFED Program to complete the remediation projects described in this proposal. Funding received from CALFED would increase the feasibility of the proposed project tasks and increase the expected benefits to aquatic species in Spring Creek and the upper Sacramento River. MRRC welcomes the opportunity to work together with the CALFED Program to achieve a substantial and rapid reduction in heavy metal loads to the Sacramento River watershed.

Proposal for Funding for Remediation of the Stowell Mine

Submitted by

Mining Remedial Recovery Company

Principal Investigators

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Type of Organization: Private Corporation
Tax Status: For Profit
Tax Identification Number: 25-161-2929
RFP Project Group Type: Construction

Project Description

Background Information

The Stowell Mine is located in the Spring Creek drainage. A regional map that includes the Stowell Mine is shown in Figure 1 and a detailed base map of the site is shown in Plate 1. This copper mine was active during the early 1900's. The two main portals were sealed in 1991 and 1994. Water discharged from the Upper and Lower Stowell Mine portals is piped around the waste rock areas and discharged into Spring Creek downstream of the mine.

The metal loads from the Stowell Mine are shown in Figures 2 and 3, and metal concentrations in Spring Creek are shown in Figures 4 and 5. After piping the portal water downstream, it was determined that groundwater flow is a significant source of metal loading to Spring Creek.

Project Approach

The components of the Stowell Mine remediation project focus on the most significant sources of AMD in the vicinity of the mine site, and will be implemented in a phased approach. By implementing the project components sequentially, the need for each successive control measure can be evaluated before additional capital is invested. Further, each remedial action can be adapted appropriately to altered site conditions. The project tasks are outlined below.

1. Consolidate waste rock area
The waste rock area outside the Upper Stowell Portal is a significant source of AMD. One objective of the project is to reduce the extent of surface water contact with the waste rock material. By consolidating the waste rock, the amount of mine waste exposed to oxidizing conditions will be reduced.

2. Install a surface water diversion around the waste rock areas.
The purpose of the proposed diversion channel is to further reduce the extent of surface water contact with the waste rock material, particularly during storm events. The proposed channel will collect surface water in the drainage above the mine and direct it around the waste rock material and then into Spring Creek.

3. Inject neutralizing and reducing material into mine voids
Injection of neutralizing materials into mines has the potential to both reduce the generation of AMD by sealing the mine, and to neutralize AMD at the point where it is generated. Demonstration projects underway at West Virginia University are exploring pneumatic and slurry injection methods for placing fly ash in underground mines.

Preliminary results indicate that pneumatic methods can extend borehole spacing to 30 m at costs substantially less than those of slurry methods.

Preventing the interaction of oxygen with pyrite in mine workings can effectively minimize AMD generation. One method to reduce dissolved oxygen concentration in mine water involves placing organic matter in mine workings. Organic materials, such as manure or sludge placed in mine workings are decomposed aerobically by microorganisms that consume oxygen. As the dissolved oxygen concentration in the mine water is reduced, sulfate reducing bacteria convert sulfates to sulfides. Under these reducing conditions, metals are immobilized.

4. Install pipeline and retaining wall to collect portal and seepage water
If injecting materials into the mine does not sufficiently reduce the metal load discharged from the portals, then portal water will be delivered via a pipeline to a central treatment area located just above the banks of Spring Creek. Seepage water from the waste rock piles will be intercepted by a retaining wall.

5. Install a passive limestone treatment system.
Passive limestone treatment systems can consist of 3/4" to large boulders of limestone placed in a pond, reservoir, channel or mine portal.. Limestone treatment increases the pH of AMD and immobilizes heavy metals by precipitating metal hydroxides and oxides. The proposed limestone treatment area is located along the uphill side of the retaining wall.

Expected Benefits

A primary goal of the proposed Stowell Mine remediation project is to improve water quality in the upper Sacramento River for the winter-run and spring-run chinook salmon and the steelhead trout. This project will also achieve an obvious local benefit by reducing AMD discharge rates to Spring Creek.

The Basin Plan contains the following quality objectives for copper, zinc, and cadmium for water with hardness = 40 mg/L as $CaCO_3$.

Parameter	Concentration (µg/L) (Dissolved)
Copper	5.6
Zinc	16.0
Cadmium	0.22

Metal concentrations in excess of these limits can be harmful to chinook salmon and steelhead trout. (Water Resources Control Board, 1990). The USBR, and USEPA routinely collect samples from the Sacramento River below Shasta Dam and below Keswick Reservoir. The results of these analyses indicate the that the levels of copper,

cadmium and zinc in these water samples regularly exceed detection limits. Hence, the ability of the Sacramento River to accommodate influxes of metals downstream is limited by the water quality in the upper reaches of the river. In order to achieve the Basin Plan objectives in the Sacramento River, major sources of metals in the upper watershed should be controlled as part of a comprehensive basin-wide contaminant source reduction program.

Background and Biological/Technical Justification

MRRC recently completed a comprehensive feasibility study for several mines located in the West Shasta Mining District. The study evaluated a wide range of potential AMD control and treatment technologies including:

- active chemical treatment,
- wetlands treatment,
- passive limestone treatment,
- surface reclamation of mine waste,
- surface water diversion channels,
- neutralizing or reducing material injection into mine workings, and
- extermination of AMD generating microorganisms.

An active chemical treatment system was not considered to be feasible due to the remote location of the Stowell Mine, limited space, energy requirements, labor intensiveness, and cost.

Extermination of AMD generation microorganisms was not a preferred solution due to a low expected benefit to cost ratio and considerable maintenance requirements.

The control actions included in this proposal were selected in part, because they focus on the most significant metal loads discharged from the Stowell Mine. The extent of the benefits for aquatic species in the receiving water bodies is expected to be directly related to the achieved reduction in metal loading. Furthermore, the proposed passive treatment systems will require minimal maintenance and accommodate a wide range of flowrates.

If this project proposal is approved, MRRC is prepared to proceed with the proposed control actions in the near future. As stated earlier, a detailed feasibility study has been completed, and a comprehensive monitoring program is in place. To date, MRRC has expended more than $2,000,000 on remedial activities in the West Shasta Mining District.

Proposed Scope of Work

The proposed project is divided into four components:

Design: A detailed design will be completed of the diversion channel, passive limestone treatment system, and the retention wall. Deliverables: Detailed designs superimposed on base maps of the site and a standard operating procedure for underground injections.

Preconstruction: Preconstruction activities include procurement of required permits and easements and preparing the site and surrounding area for project implementation. Since this project involves construction activities along the banks of Spring Creek, a permit will be required from the Department of Fish and Game. Deliverables: Copies of all required permits and easements, and photographs of site preparation.

Construction: The control actions will be implemented in a phased approach in order to evaluate the effects of each successive treatment system prior to proceeding with additional work. Deliverables: Weekly progress reports detailing technical and financial activities, and copies of all related purchase orders and invoices.

Monitoring: The existing monitoring program will continue throughout all phases of the project implementation. Deliverables: Monthly water quality reports.

Monitoring and Data Evaluation

MRRC periodically collects water samples and measures flow at all portals, seeps, and springs associated with the Stowell Mine. Samples are also collected from Spring Creek on a quarterly basis. Samples will be collected on a more frequent basis during and immediately after the implementation of control actions.

MRRC participates in the Sacramento River Watershed Program (SRWP), an organization that plans to coordinate and supplement several existing water quality monitoring programs operating within the Sacramento River watershed. Results from monitoring activities at the Stowell Mine will be contributed to the SRWP, and the Stowell Mine monitoring program will use sampling and analysis methods that are consistent with the SRWP. Cooperation with the SRWP will provide a venue for peer review of the monitoring and data evaluation process.

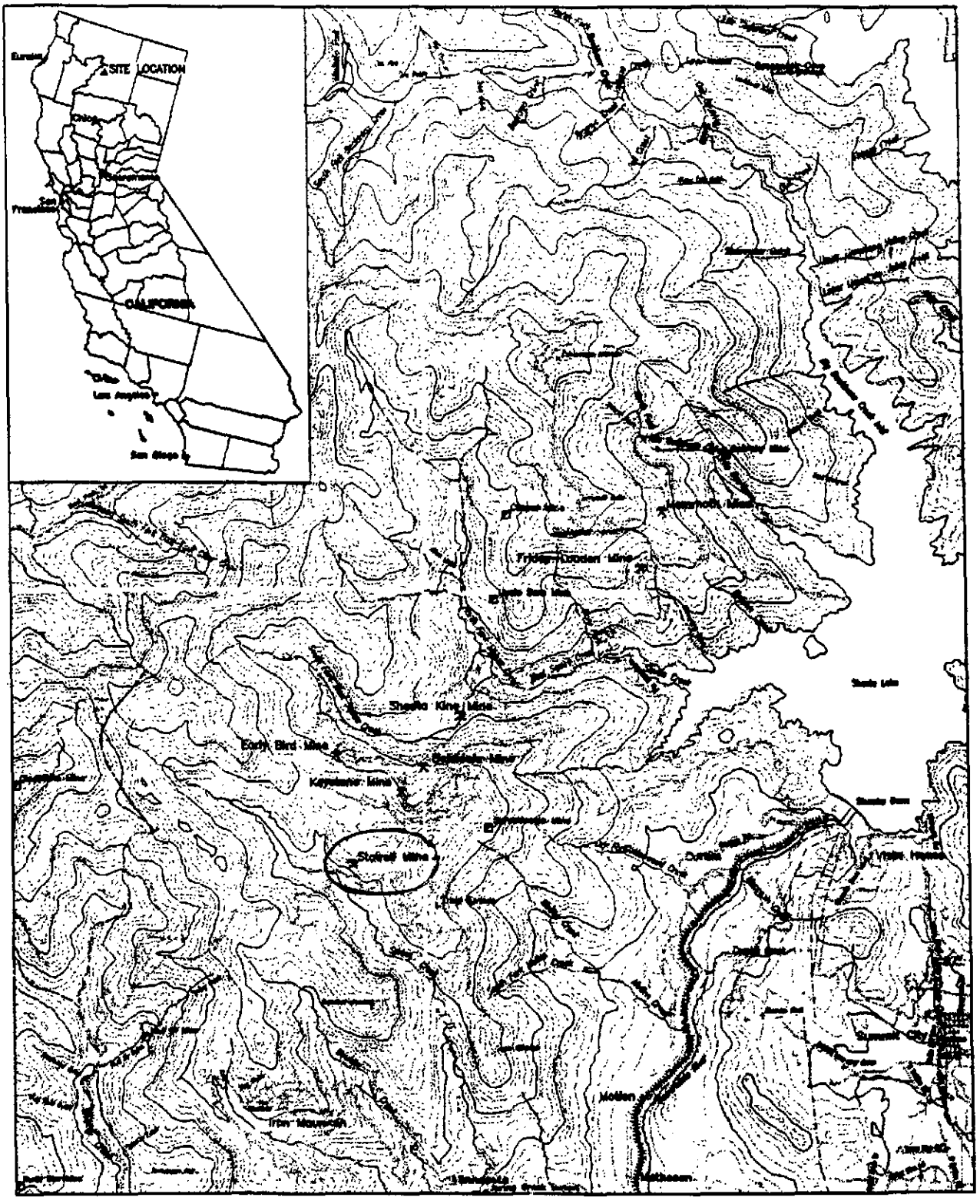
Implementability

The CRWQCB-Central Valley Region issued two orders related to the Stowell Mine on June 20, 1996. Order No. 96-154 includes waste discharge requirements for the Stowell Mine adits, and Cease and Desist Order No. 96-155 requires that MRRC comply with an

extensive task schedule. To date, MRRC has met each of the compliance deadlines contained in the cease and desist order.

It is not expected that implementation of this project will result in significant third party impacts. The Stowell Mine, lies in part on property owned by Shasta Copper Exploration, Inc. MRRC has sent a copy of this proposal to Shasta Copper Exploration, Inc., and is awaiting comments. MRRC will also submit copies of this proposal to appropriate parties at the CRWQCB, the California Department of Fish and Game, the US Forest Service, the US Bureau of Land Management, and US Bureau of Reclamation. In addition, MRRC will post applicable signs along the access road to the work sites during construction.

If required to do so, MRRC will coordinate an environmental assessment prior to implementation of the proposed control actions. Further, MRRC will assure that all applicable OSHA and MSHA requirements are met.



Mining Remedial Recovery Company

MRRC

8000 0 8000

SCALE IN FEET

LOCATION MAP OF MRRC MINES

I –002624

AdrianBrown

I-002624

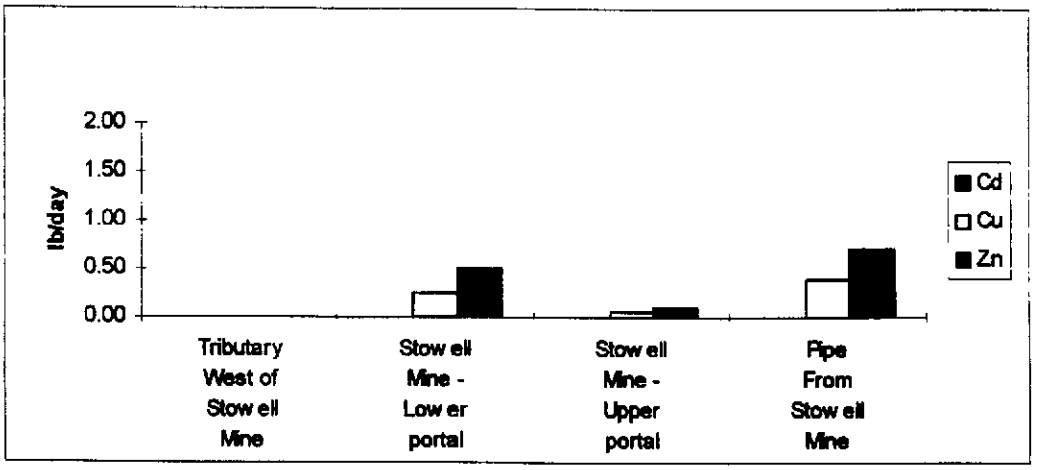


Figure 2. Metal Loads from the Stowell Mine - August 1996

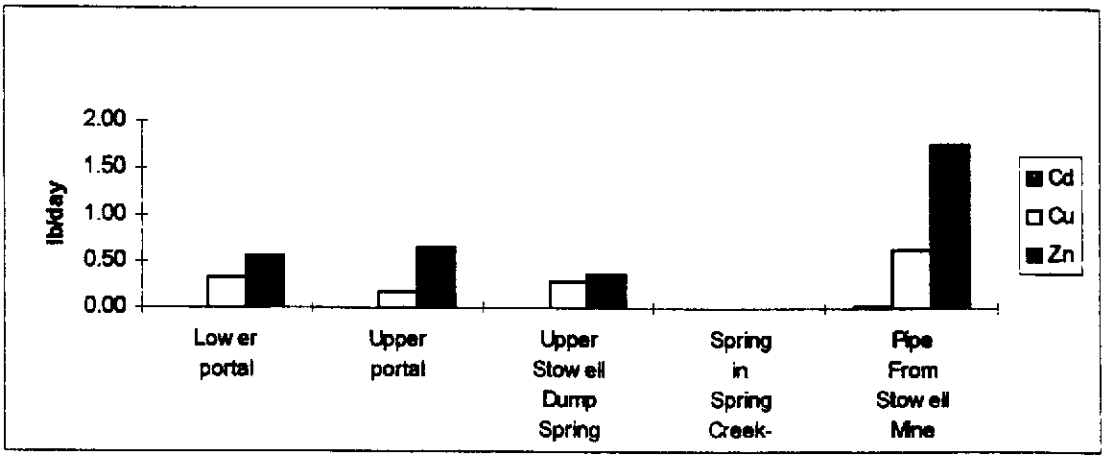


Figure 3. Metal Load from the Stowell Mine - March 1997

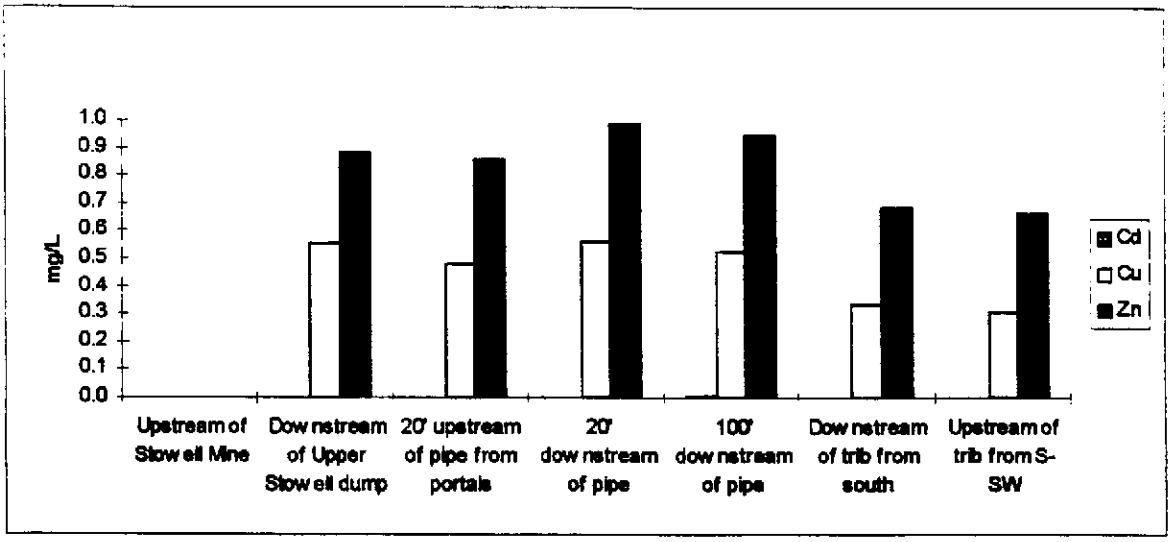


Figure 4. Metal Concentrations in Spring Creek - August 1996

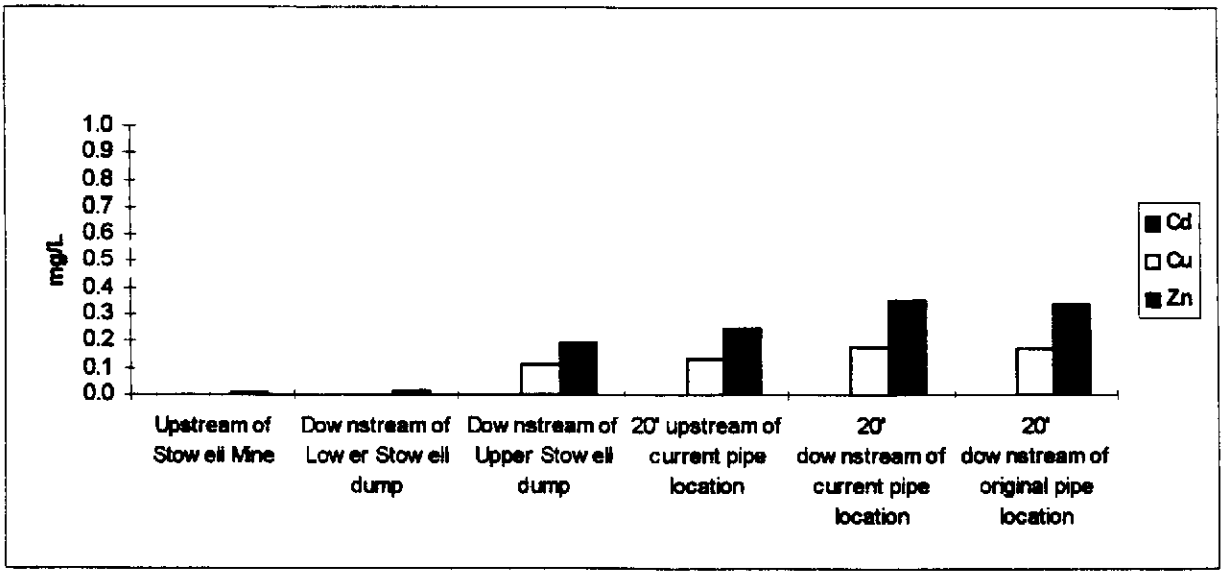


Figure 5. Metal Concentrations in Spring Creek - March 1997

Costs and Schedule to Implement Stowell Mine Remediation Project

Budget Costs

The budgeted cost for each proposed task is outlined in Table 2.

Table 2. Cost breakdown for project tasks.

Project Task	*Direct Salary and Benefits*	*Overhead Labor*	*Service Contracts*	*Material Costs*	*Maintenance Costs for 10 years*	*Total Costs*
1	1,000	500	48,500	0	0	$50,00
2	2,000	1,000	67,000	30,000	0	100,00
3	2,500	1,500	96,000	100,000	0	200,00
4	2,000	2,000	60,000	36,000	10,000/yr	200,00
5	2,000	2,000	40,000	56,000	10,000/yr	200,00
					Total Cost	**$750,00**

MRRC is open to negotiating a cost sharing plan with the CALFED Program to complete the remediation projects described in this proposal. CALFED Program resources allocated to any of the outlined tasks would increase the economical feasibility of that task, and increase the expected benefits for aquatic species.

MRRC plans to hire subcontractors to complete the construction components of the proposed tasks. In selecting subcontractors, MRRC will solicit bids and evaluate potential subcontractors based upon the following factors:

- related project experience,
- appropriate licenses and credentials,
- OSHA certification,
- MSHA certification, and
- cost.

Schedule Milestones

A schedule for the proposed project tasks is shown in Table 3. MRRC would appreciate receiving CALFED funding prior to each completion date, but is open to other payment schedules.

Table 3. Task Schedule

Task	Completion Date
1. Consolidate waste rock area	10/1/97
2. Install a surface water diversion around waste rock area	11/1/97
3. Inject neutralizing and reducing material into mine voids	12/19/97
4. Install pipeline to collect portal and seepage water	5/1/98
5. Install a passive limestone treatment system	6/1/98

Third Party Impacts

It is not expected that implementation of this project will result in any significant third party impacts. The Stowell Mine is remotely located, and the mine site and the surrounding acreage are the property of MRRC. However, MRRC will submit a description of selected remedial actions to appropriate parties at the CRWQCB, the California Department of Fish and Game, the Forest Service, the Bureau of Land Management, and Bureau of Reclamation. MRRC will also post applicable signs along the access road to the work site during construction.

Applicant Qualifications

MRRC was formed specifically to remediate sites impacted by mining activities, and is actively reclaiming several mine, mill, and smelter sites located throughout the United States. Key personnel at MRRC have extensive knowledge of general mine remediation technologies, as well as the site specific conditions at the Stowell Mine.

In 1995, MRRC completed a remediation project at the Sunbank Mine site located near Silverton, Colorada. Sixty percent of the funding for this project was provided by the US EPA. The mine openings and adits were backfilled, regraded and capped. The mine dump was removed from the stream, consolidated into one area, regraded, and capped. Currently, AMD from the mine is collected and passed through a limestone treatment system which then feeds into a series of settling ponds. This project has resulted in substantial improvements to water quality, and demonstrates MRRC ability to work with a government agency to achieve a common goal.

MRRC personnel who are involved in the Stowell Mine project are profiled below.

Michael W. Baum, President

Michael Baum will manage the financial aspects of the proposed Stowell Mine remediation project. Mr. Baum has over 20 years of management experience in the areas of construction, mine operation and mine reclamation. He has been directly in charge of operations and reclamation at more than twenty mine, mill, and smelter sites located throughout the United States. Mr. Baum has been involved in numerous negotiations involving Consent Decrees for remedial activities in both the CERCLA and RCRA programs, and has been responsible for the attainment of several permits required to perform remedial and mining activities.

Ken Henderson, Construction Manager/Administration

Ken Henderson will manage the construction of the proposed Stowell Mine remediation project. Mr. Henderson has over 30 years of management and technical experience in the areas of mine operations, project design, and construction management. He holds a degree in Mining Engineering for the University of Colorado and an Environmental Law Degree from the University of Arizona. Mr. Henderson has been involved in the management of several mining operations and mine remediation projects throughout the western United States.

Linda Mercurio, Environmental Engineer/Project Manager

Linda Mercurio will coordinate the design, implementation, and monitoring components of the proposed project. Ms. Mercurio holds an M.S. in Environmental Engineering from Utah State University and a B.S. in Mathematics Education from Northeastern University. She has extensive knowledge of the water quality issues related to the Stowell Mine and has been instrumental in evaluating potential control actions.

Don Simpson, Project Designer
Don Simpson will assist with remedial actions related to underground mine workings. Mr. Simpson has been involved with the management of metal mining and milling for over 40 years. He holds a degree in Mining Engineering from the University of Arizona. During his career, Mr. Simpson has held senior management positions in mine exploration, production, and reclamation.

Compliance with Standard Terms and Conditions

Attached please find the required forms for a successful proposal. MRRC has elected not to submit a bidder's bond at this time because subcontractors will perform the majority of the public works construction efforts. As stated on the CALFED Category III RFP internet site, under these circumstances, bid and payment bonds can be deferred until such time as subcontracts are sought and awarded, and before work is performed. It is understood that obligations from CALFED to MRRC will be contingent upon receiving the bid/payment bonds.

Ken Henderson is a licenced general contractor in the State of California.
(Licence No. 728820)

NONDISCRIMINATION COMPLIANCE STATEMENT

Mining Remedial Recovery Company (MRRC) hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. MRRC agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, Linda Mercurio, hereby swear that I am duly authorized to legally bind MRRC to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

Linda M. Mercurio — July 25, 1997, Shasta County, California
Linda M. Mercurio
Environmental Engineer and Project Manager
Mining Remedial Recovery Company

NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS

STATE OF CALIFORNIA
COUNTY OF SHASTA

Linda Mercurio, being first duly sworn, deposes and says that she is a Project Manager and Environmental Engineer employed by Mining Remedial Recovery Company (MRRC) the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly colluded, conspired, connived, or agreed with the any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: 25 July 1997 By Linda Mercurio

Subscribe and sworn to before me on
July 25, 1997
Laurie Carroll
(Notary Public)

LAURIE CARROLL
Commission # 1058837
Notary Public — California
Butte County
My Comm. Expires Oct 29 1999